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In re Application of:

Hans SIGRIST et al.

Group Art Unit: 1634

Serial No.: 09/606,040

Examiner: Arun K. Chakrabarti

Filed: June 29, 2000

For: PROCESS FOR THE MODIFICATION OF SURFACES

REQUEST FOR RECONSIDERATION

Commissioner for Patents  
Washington, D. C. 20231

Sir:

Applicants request reconsideration of the rejections in the Office Action mailed March 13, 2002 in view of the following remarks.

Applicants initially seek clarification with respect to the status of claims 12 to 15. Those claims were withdrawn in the Office Action mailed August 29, 2001. Have claims 12 to 15 now been examined?

The rejection of claim 5 under the second paragraph of 35 USC 112 as allegedly indefinite for containing the phrase "may be" is

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respectfully traversed. The Examiner states it is unclear whether the limitations following the phrase are part of the claimed invention. Applicants respectfully submit that one reading claim 5 understands that it indicates merely that the alkylene moiety of R optionally may be interrupted by the designated oxygen or nitrogen-containing group moieties. It is respectfully submitted that the claim is clear and that the reader has no difficulty in understanding what is intended thereby. The rejection should be withdrawn. If, after consideration of the foregoing explanation, the Examiner wants the claims changed in some way, the Examiner is asked to contact the undersigned.

The rejection of claims 1 to 20 under 35 USC 103 as allegedly unpatentable over Miyasaka et al. '808 in view of Mazid et al. '460, both newly cited, is respectfully traversed. (Applicants again question whether claims 12 to 15 are part of this rejection.)

The references in combination do not teach or suggest the subject matter of the instant claims which is directed to a method for preparing a carbohydrate substrate on a material substrate wherein, following photochemical fixation of a mono- or oligosaccharide-containing material of formulae (1a) and (1b) of claim 1, there is an enzymatic attachment of at least one further

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carbohydrate to the X radicals of the modified surface attained according to the photochemical fixation steps (a<sub>1</sub>) or (a<sub>2</sub>)

The Examiner asserts in essence that the primary reference teaches a photochemical fixing of at least one compound onto a material surface in carbohydrate preparation where the fixation is undertaken using azide electron withdrawing groups. (In this regard, Miyasaka et al. '808 is similar to number of the previously cited references. The claimed invention still patentably defines thereover.) The Examiner acknowledges in the third full paragraph on page 4 of the Office Action that the primary reference does not teach a process for enzymatic attachment of at least one further carbohydrate to the X radicals of a modified surface (steps (a<sub>1</sub>) and (a<sub>2</sub>) of claim 1). Mazid et al. '460 is said to supply the teaching necessary to render the claimed subject matter obvious. Applicants disagree with the Examiner's conclusion for a number of reasons.

Applicants respectfully but strongly dispute that Mazid et al. '460 in the Abstract, col. 2, working examples, and claims "teach a process of attaching enzymatically one or more further carbohydrates to the X radicals of the modified surface [presumably as shown in Miyasaka et al '808]."

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The secondary reference does not properly teach or suggest the asserted modification of the primary reference teaching because Mazid et al. '460 describes using enzymes, including carbohydrate-modifying enzymes that are immobilized at a material surface acting on mono- and oligosaccharides. The enzyme substrate, e.g., a carbohydrate entity to be modified by carbohydrate-modifying enzymes, is presented in a soluble rather than in an immobilized form. The working examples of the reference show that the immobilized enzyme is a material facilitating oligosaccharide formation. The reference doesn't teach or suggest enzymatic attachment of at least one carbohydrate the mono- or oligosaccharide radical of a material formed in step (a<sub>1</sub>) or (a<sub>2</sub>) of instant claim 1.

The present invention, in contrast, is directed to a process where a diazirine-modified carbohydrate can be attached by photochemical means to a material substrate which, unlike the primary reference teachings, does not present carbene-generating entities at the surface. The carbene-generating molecular entity is a part of the carbohydrate substrate. The invention also shows for the first time that the surface-immobilized enzyme substrates are recognized as enzyme substrates by carbohydrate-modifying

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enzymes such as glycosyltransferases. Upon photochemical attachment of diazirine-labeled carbohydrates, the carbohydrate portion remains structurally intact and can be recognized as an enzyme substrate by the carbohydrate-modifying enzymes.

If the enzyme substrates are presented directly to a photochemically active material surface as described in the Office Action, the carbohydrate substrate would be covalently bound to the surface through chemical functional groups of the carbohydrate substrate (the OH functions of the carbohydrate molecule) that are essential for enzyme recognition. The carbohydrate-modifying enzymes cannot catalyze the specific reactions.

Applicants seek clarification with respect to mention in the art rejection discussion of a "Comanor et al." and a quotation therefrom. The citation does not appear to be of a reference of record.

For the reasons given above, the references in combination do not teach or suggest the instant invention and the rejection should be withdrawn.

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The Examiner is asked to contact the undersigned if any changes are required in the case prior to allowance.

Respectfully submitted,

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September 12, 2002

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